

other instruments as well. The Telegraph Department has recently published a summary for the Curitiba station, covering a period of twenty-three years, May, 1884–December, 1907, and giving very fully the results of the observations at this important place. For length and completeness of record, and importance of location, this Curitiba summary easily stands first in Brazilian climatology.

THE METEOROLOGICAL SERVICE OF SAO PAULO.

The first organized meteorological service in Brazil, and one which has become well known by reason of its good work, was that inaugurated by Prof. Alberto Lofgren in the State of São Paulo in the year 1887, under the able direction of Dr. Orville A. Derby, then head of the Comissão Geographica e Geologica de São Paulo, and now chief of the Brazilian Geological and Mineralogical Service.

From the beginning of this service in 1887, when there were but two stations, the number of observers increased to nearly fifty in 1901, giving São Paulo the distinction of having the greatest number of meteorological observers in a given area of any South American country. The observers, chiefly teachers, engineers, and telegraph officials, are paid according to the order of their stations, from \$8 to \$12 a month, the State government having been liberal in its appropriations of money for the maintenance of the service. Observations are made at 7 a. m., 2 and 9 p. m., and about one-half of the stations are equipped with self-recording instruments.

The annual meteorological publications of the São Paulo Commission (Secção Meteorologica. Dados Climatologicos, 1887–1903) have been notable because of their completeness. The first rainfall map of São Paulo was published in the volume for 1901. In 1902 the meteorological service was reorganized under J. N. Belfort Mattos, and in 1904 the work was put under the Department of Agriculture, Commerce, and Public Works. The annual volumes for 1904 and 1905 have not yet been issued. Beginning with the year 1906 the Boletim, published quarterly, replaced the annual volume. Numbers 18–21, 1906, and Series 2a, Numbers 1–3, 1907, have appeared. These bulletins give the data for all the stations; a map for each month, showing isobars, isotherms, rainfall, cloudiness, wind, etc.; and also contain views of some of the meteorological stations. The latest Boletim (Series 2a, Number 2, 1907) contains data for thirty-seven stations. Bulletin 3 of the second series is a special publication prepared for the National Exposition at Rio de Janeiro (1908), containing an historical summary of the São Paulo meteorological service, and a brief account by J. N. Belfort Mattos, of the climatology of São Paulo, with January, July, and mean annual isobars, isotherms, rainfall, and cloudiness.² A daily forecast is made at the central station in the city of São Paulo for the State of São Paulo, but no map is issued. About thirty stations report daily, by telegraph, their Greenwich noon observations. This number includes several stations outside of the State of São Paulo.

THE METEOROLOGICAL SERVICE OF MINAS GERAES.

The Geographical and Geological Commission of the State of Minas Geraes has organized a meteorological service on a very much smaller scale than that of São Paulo, and has published certain Boletins on the climate of stations in that province.

This article is not concerned with publications on Brazilian meteorology and climatology other than those issued officially by Government departments, but mention may very properly be made of the numerous contributions of the late Prof. F. M. Draenert, formerly of the Agricultural College at Uberaba (Minas Geraes). His "O Clima do Brésil" (Rio de Janeiro, 1896), in reality a text-book of meteorology and climatology, is especially deserving of mention. Dr. E. L. Voss,³ has also

² In 1905 there was issued a previous publication by the same author, entitled Breve Noticia sobre o Clima de São Paulo.

³ Beiträge zur Klimatologie der südlichen Staaten von Brasilien. Pet. Mitth., Ergänzungsheft 145, 1904.

published an important monograph, which presents the results of observations in the State of São Paulo from 1887. References to the other publications on Brazilian climatology may be found in the bibliographies.

The writer is greatly indebted to Dr. O. A. Derby, Chief of the Mineralogical and Geological Service of Brazil, for assistance in collecting the above facts.

NOTES FROM THE WEATHER BUREAU LIBRARY.

By C. FITZHUGH TALMAN, Librarian.

THE SAMOA OBSERVATORY.

The Royal Society of Sciences of Göttingen has just published an extensive history and description of the geophysical observatory that it has maintained at Apia, Samoa, since the summer of 1902.¹ Several charts and photographs accompany this publication. Originally established for a period of only fifteen months, chiefly with a view to obtaining seismological and magnetic observations synchronous with the observations of the German South Polar Expedition, the observatory soon proved to be so valuable that means were found to prolong its life for a further period of five years, and it now seems likely to be made a permanent institution. From the beginning the necessary funds have been provided, half by the German Imperial Government and half by the Prussian Ministry of Education. (See figs. 1 and 2.)

The work of the institution is described under four heads: Terrestrial magnetism, seismology, atmospheric electricity and meteorology. The meteorological equipment includes, besides all the ordinary self-recording instruments, a complete outfit for kite-flying, and many successful kite flights have been carried out.

The observatory is the headquarters of a network of thirty climatological stations in Samoa; and if the plans of its former director, Doctor Linke, are carried out, it will ultimately become the center of a system of stations extending over all the South Sea Islands from the equator to latitude 35° south.

OBSERVATIONS AT CAPE SPARTEL, MOROCCO.

The best meteorological station in Morocco is said to be that maintained in connection with Lloyd's signal station at Cape Spartel. The observations made there were first brought to the attention of the meteorological world by Prof. Theobald Fischer, in his discussion of all the available climatological data for Morocco ("Zur Klimatologie von Marokko") in Zeitschrift der Gesellschaft für Erdkunde zu Berlin, Band XXXV, 1900. The station has been in operation since January, 1894, but the results of observations, tho published in a yearly table by Lloyd's, have scarcely yet found their way into the scientific libraries. We are glad, therefore, to see a résumé of the observations for 1907 published in the September, 1908, number of Das Wetter (Berlin).

The climate of the Moroccan coast is now pretty well known, observations having been maintained for several years at Mogador, Saffi, Casablanca, Rabat, Tangier, and, as just noted, at Cape Spartel. The interior, however, with the exception of the town of Morocco (Marrakesh), remains almost wholly unknown to the climatologist.

THE MORNING ROUTINE AT A GERMAN WEATHER STATION.

Under the title "Ein Vormittag an einer Wetterdienststelle," O. Freybe, in the September number of the Das Wetter, describes in graphic detail the routine of an average morning at one of the stations of the new Public Weather Service of Germany, viz: the station at Weilburg—from the arrival of the female assistant, to begin her "hausmütterlichen Geschäfte"

¹ Ergebnisse der Arbeiten des Samoa-Observatoriums der Königlichen Gesellschaft der Wissenschaften zu Göttingen. I. Das Samoa-Observatorium, von Hermann Wagner. Berlin, 1906. (Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen. Mathematisch-physikalische Klasse. Neue Folge Band VII. Nro. 1.)



FIG. 1.—Main building of Samoa Observatory, Apia.



FIG. 2.—Instrument shelter at Samoa Observatory, Apia.

with broom and dust-pan at 7 a. m., to the delivery of the last bundle of weather maps at the post-office, about 11:30 p. m. The same well-systematized rush prevails as at the stations of our own Weather Bureau; and the same delays and hindrances occasionally supervene; when, as Herr Freybe puts it, "the temperature in the office not infrequently rises above the normal." The reports from the various European stations are transmitted from the Seewarte, at Hamburg, in two dispatches, which are received from the telegraph office by telephone and

entered on the manuscript maps in twelve to fifteen minutes and four to five minutes, respectively.

A NEW CLOUD ATLAS.

From the Royal Observatory of Belgium comes a new cloud atlas,² designed to make familiar to the public, and especially to meteorological observers, a much amplified version of the International Classification of Clouds. This work distinguishes numerous varieties of each of the forms included in the International Classification, the Latin designations being mostly borrowed from the systems proposed by Maze, Clayton, Weillbach, Ch. Ritter and other cloud specialists. There are twenty-eight excellent half-tone illustrations.

Since Clayton published his exhaustive historical sketch of cloud nomenclature in the *Annals of Harvard College Observatory*, Vol. XXX, Part IV, (Cambridge, Mass., 1896), several elaborate systems of classification have been proposed, so that there is now quite a bewildering variety of names to choose from in designating the subdivisions of the simple types included in the International Classification. Fortunately, however, the latter classification alone answers the ordinary requirements of meteorological observation, and has been adopted by nearly all the meteorological services and independent observatories of the world.

COMPOSITION OF THE AIR AT HIGH ALTITUDES.

Ciel et Terre of October 1, 1908, contains a brief account of experiments carried on by M. Teisserenc de Bort to determine the composition of the air in the isothermal zone or "warm layer" of the atmosphere, especially with regard to its richness in the rare gasses, helium, argon, etc. A glass tube, exhausted of air and sealed at both ends, was attached to a sounding balloon. When the apparatus reached a sufficient height a small hammer, actuated by the meteorograph, struck one end of the tube and broke it, admitting the air. The tube was subsequently resealed by an electric current sent thru a platinum wire coiled around the tube at the broken end. The amount of air thus secured was too small to admit of quantitative chemical analysis, but was studied qualitatively by means of the spectroscope. Two methods were followed in different experiments; in one all the elements of the air except helium and neon were removed thru absorption by carbon; in the other the argon was separated first.

Analysis revealed the presence of argon and neon in the samples of air taken at all altitudes, from 8 to 14 kilometers. Helium was found in most of the samples, except those taken at the greatest altitude attained, viz, 14 kilometers. Whether krypton was present in the samples could not be determined.

An account of these investigations also appears in the *Quarterly Journal of the Royal Meteorological Society*, July, 1908, p. 189-190.

METEOROLOGY AT THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Among the many interesting papers presented before *Section B—Physics* of the American Association for the Advancement of Science at the summer meeting held in the Wilder Laboratory of Dartmouth College, Hanover, N. H., June 30, 1908, two seem to be of special interest to students in meteorology and climatology. The following abstracts of these papers appeared in *Science*, of August 21, 1908:

A study of overcast skies.—E. L. Nichols, Cornell University.

The spectro-photometric measurements which formed the basis of this paper were carried out, during the travels of the author in Europe, by means of a handy portable apparatus which gave the opportunity to compare the skies of widely different localities and at different times of day. The relative intensities of the individual color-components were very different with different kinds of sky. The radiation was rarely selective but almost always of the "black body" type. There is, however, almost

² Vincent, J. *Atlas des nuages*. Bruxelles, 1907. (*Annales de l'Observatoire royal de Belgique. Nouvelle série. Annales météorologiques.*)